

AUDIO ON LOCATION

TECHNICAL FIELD

This invention relates generally to location-specific mobile telecommunications systems. More specifically, the present invention relates to a remotely accessible, location-specific, information storage and retrieval system.

BACKGROUND OF THE INVENTION

Conventional location-specific information systems are used to provide locally relevant information. For instance, a business establishment may play a recording announcing the goods or services that the establishment provides. Similarly, many museums have sound recordings that correspond to exhibits. These systems must be sufficiently spatially separated such that the audio signals do not interfere with one another. One proposed approach to preventing interference is to provide headphones at various locations. This approach has the advantage of allowing users to start the message when they arrive and in some cases even to select the language of the message. Such systems often require a significant infrastructure, and in some systems it is quite difficult to change the message.

Other current systems for delivering localized information to users rely on low power AM radio signals. Such systems are commonly used with respect to traffic and road conditions. This approach, while having much simpler requirements than the systems referred to above, suffers from additional significant drawbacks. First, such an approach is not location specific, but rather likely covers a fairly broad geographical area. Accordingly, the radio system likely delivers a

general message applicable to the entire coverage area, and the listener may need to listen to an entire lengthy message in order to obtain the desired specific information. Furthermore, meteorological variations can impact both the area of coverage and quality of the radio signal.

5 Existing location-specific information systems do not enable real time access to evolving location-specific information and do not enable users to add new information. In addition, currently utilized location-specific information systems which track the user's position either require significant external infrastructure to facilitate user tracking or rely on very coarse position information, such as that obtained from a cellular phone. Presently a need exists for a
10 system that enables users to access embedded information attached to a specific location by another user. Further, there is a need for a system that is capable of providing real time placement of annotations at various locations in the user's environment.

SUMMARY OF THE INVENTION

15 The present invention overcomes deficiencies of currently available location-specific information systems as discussed above. The invention described herein provides a device and method that enables a user to access embedded information associated with a specific location by another user. The present invention further provides for real time placement of new location specific annotations.

20 The device according to the present invention is comprised of a user interface, a position sensor, an information server, and a playback manager. The user interface provides a user with the ability to submit queries to a database; the user interface also provides information back to the

user. The position sensor is comprised of a variety of complimentary sensors that provide user position and orientation to assist with the user-generated queries. The information server takes the position data and the information request and queries the database, references are then sent to the playback manager, and the playback manager delivers the preference filtered, location-specific information to the user interface.

Additionally, audio information can be spatially enhanced based on user position and orientation to appear to be coming from the area or object with which the audio is associated. In situations where the information is available only in text form or in a language other than the user's language of choice, the information is translated to spoken language as selected by the user. The database of location specific information is either contained in a distributed web based information server networked to a plurality of information sources or a dedicated independent server. Retrieved information can be user-annotated or user-modified, subject to parameters dictated by the system administrator. The user interface is not limited to a cellular phone; it can be any fixed or mobile communication device including traditional phones, computers, transceivers, radios, or mobile phones. The location of interest can be determined four ways: from the user's position, from the user's expected destination based on orientation, from a stationary user's reported destination, and from the user's designation of a remote location.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of this specification, illustrate embodiments of the invention and, together with the description, serve to explain the principles of the invention:

FIG. 1 is a general overview of an embodiment of the invention showing, without detail, how the invention functions;

5 **FIG. 2** is a flowchart of one embodiment of how the operation for audio retrieval may be performed;

FIG. 3 is a block diagram of one embodiment of the operation of the information server;

10 **FIG. 4** is a view of one embodiment that shows a simple cellular phone-based use of the system;

FIG. 5 is a view of one embodiment that shows a menu based interaction between a user with a cellular phone and the system; and

15 **FIG. 6** is a view of one embodiment that shows how a user may add audio annotation to the information server.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be included within the spirit and scope of

the invention as defined by the appended claims. Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be obvious to one of ordinary skill in the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to unnecessarily obscure aspects of the present invention.

The present invention provides a system capable of providing interactive, remotely accessible, location-specific information. In one embodiment of this invention an information storage device categorically stores audio information by location. This information can then be accessed and modified or annotated by two-way telecommunication devices. In cases where only textual information is associated with the location, the user has the option of displaying the text or having the text automatically translated into an audible spoken language of the user's choice.

The following is one example of how the location information system provides a system capable of receiving a request for information. The request may be either an oral request or other type of signal originating with the user. The system determines the user's position; this may be done through a system-induced prompt or by a position report from either the user's device or external sources such as a global positioning system (GPS) or position triangulation using a plurality of antennae. Other position detection systems may also be used. Based on the user's location, and the nature of the query, the appropriate information is transmitted to the user. Alternatively, the system may receive a request to annotate or modify the information associated with a location. In this alternate embodiment of the present invention, the system queries the user for location,

for subject matter, and then allows the requestor to transmit the information. This new information is then categorically stored, and immediately becomes accessible to other users.

The present invention has a broad base of potential users, including military and law enforcement personnel, search and rescue teams, drivers, consumers and many others. The invention is useful in any situation where a user wants or needs information pertaining to the user's position; additionally, the invention has utility as a means of "marking" a location for others. The term marking is to be understood as a figurative term denoting an electronic annotation that pertains to a specific geographical location.

A simple depiction of the invention is shown in **FIG. 1**. Mobile users **102** can access an information server **100** with a variety of transceivers, including cellular telephones and two-way radios. Fixed users **104** can access the information server **100** with virtually any devices that will allow them access to the information server **100**, including an optional Internet connection, a cable connection, or a conventional telephone connection.

The ability of this invention to provide a forum whereby a user can access location specific information, and optionally search by subject using that information, is an important element of the present invention. A major component of the invention is its ability to easily provide location specific, real-time information that is remotely accessible. The ability for the information to be updated by users or other approved annotators allows for real-time reviews of specific location information and, further, optionally allows authorized users to post updates for specific locations, thus creating a type of forum. Additionally, this forum would be excellent for

100 can then retrieve the audio information that is stored relating to that specific location, and send it to the user.

Additional embodiments of the present invention allow explicit querying of the information server **100** based on the position and orientation of the user. Such querying can be achieved with the aid of a body-worn device such as a compass that transmits the orientation of the user to the information server **100**. Alternatively, the orientation-detecting device could be contained within a telecommunication device. In these embodiments of the present invention, the user designates a subject or region of interest from a remote position. The system then determines what objects are potentially of interest between the user's current position and the user's desired position. The appropriate audio information can then be retrieved and played. The utilization of an orientation-device allows for this information to be optionally spatialized, and thus the audio can be enhanced to appear to be originating from the object or location of interest.

Inherent in the embodiments of the present invention are a plurality of software elements designed to execute the various functions of the invention; these elements are depicted according to function in **FIG 3**. First, the user interface **200** provides the user with the ability to selectively control the scope and generation of queries using voice, keyboard, touch pad or other input device. It also allows the user to provide relevant information in the form of preferences to aid in selecting and controlling audio playback messages.

The content input at the user interface **200** can be received by multiple functions within the software elements of the present invention, in particular, the content manager **300**, the position

manager 306, and the user preference manager 310. The content manager function 300 may receive content from the user interface 200 and subsequently send the appropriate links to the database update manager 302. The content manager 300 may then send the content provided to the content pool manager 304. Content provided at the user interface 200, whether as audio, text, or other form, may be stored in the content pool manager 304 as files referenced by a remote data storage location. This content may be locally or remotely distributed completely from the other system components.

Content in the present invention may also take the form of user preferences, either explicitly provided by the user at the user interface 200 or determined automatically by the system. The user preference manager 310 receives this content and subsequently supplies the appropriate information to the database query manager 308. The database query manager 308 in turn utilizes a filtering mechanism to identify specific types of audio information available in the database 312 that will be of interest to the user based on the user preference content. Classes of information might include public, private, business (e.g. restaurant, commerce), navigation, and general.

In the present invention, the user may explicitly provide position data at the user interface 200, or optionally have the position data automatically sent. The position manager 306 takes any user supplied position data, or alternatively position data from sensors, and sends this data to the database update manager 302 to be linked with the current recorded content. The database update manager 302 matches the content references with the position data, and updates the database 312 accordingly. Alternately, the position data may be received by the database query

manager **308**, which subsequently uses the position data to query the database **312** regarding relevant information.

Relevant content retrieved from the database **312** or the content pool manager **304** is received by the playback manager **210** which in turn sends it to the user interface **200**. The audio may be spatially enhanced to appear to be coming from the area or object with which the audio was associated. In cases where only textual information is associated with the location, the user has the option of displaying the text or having the text automatically translated into an audible spoken language of the users choice at the user interface **200**. Additionally the user has the ability to specify the audio playback to be in a language of the users choice.

In one preferred embodiment of the invention, a user with a mobile phone and GPS dials the number for the information server **100**. **FIG. 4** shows the user's interaction with the information server **100** through an automatic call answering service **412** for the simplest case in which there is only one item of information within the desired range of the user's position. After the user dials the number **400** of the call answering service **412**, the system requests the users position **402**, and either the position is supplied by the cellular phone **404A**, or by the user **404B**. The user position **406** is then supplied to the information server **100** which in turn supplies the location-associated audio **408** to the answering system **412**. The answering system **412** then supplies this audio information **410** to the user.

In another preferred embodiment of the invention a slightly more complex operation takes place. The user hears a menu of items to allow the selection of specific information types or system

functions. In one potential scenario the user selects to hear all the current audio about a specific location, and might hear something like “There are 5 information items within 20 meters of your current position. You may choose to listen to any one of them by entering the number of the item followed by the # sign. They are 1____, 2____, 3____, 4____, and 5____.” The user enters the number for the item of interest. The information is then retrieved from the server and played through the cell phone line as audio.

A more detailed example is shown in **FIG. 5**. The user dials **500** the call answering service **412**, the system requests the users position **502**, and either the cellular phone responds with the user position **504A** or the user provides the location **504B**. The user position is then supplied **506** to the information server **100**, and the information server **100** informs the call answering service **412** with the number of items stored for that geographic location **508**. The call answering service **412** then supplies the user with a menu of choices **510**, the user selects from the menu **512**, the call answering service **412** supplies the specific request **514** to the information server **100**, and the information server **100** then supplies the requested audio information **516** to the call answering service **412**, which in turn supplies the audio **518** to the user.

In another embodiment, the system may be used in an information push mode where user location is constantly streamed to the server **100**, and the server **100** automatically identifies and sends the audio to the user based on the user’s location. User location can be determined with the aid of a global positioning system (GPS), or other location-determining devices.

FIG. 6 shows a case where a user annotates a geographic location. The user calls **600** the call answering service **412**, the system requests the user position **602**, and the cellular phone **604A** or the user provides the position **604B**. A menu of choices is supplied to the user **606** so that the user can select what category the information should be stored in **608**. The user may hear something like “Press one to enter information on restaurants, or press two to enter information on businesses.” The user then speaks the audio **610**, the answering service **412** sends the user position **612**, and the audio annotation information **614** to the information server **100**. This audio is then immediately available for other users.

The ability of the present invention to supply audio information that is location-specific, and optionally, category- or orientation-specific, has obvious merits. Because the users, and specified annotators, can easily submit information updates, the current validity and relevance of the information provided by the system can be maintained. Fixed users **104** will have the ability to plan for an evening out, or a business trip across the country. The fixed users **104** will be able to peruse what a city has to offer from distant locations, and with an Internet interface, make reservations with the advantage of having the input of real-time reviews on which to base their decisions.

The present invention may provide the ability for a user to receive a real-time traffic report for the actual road that the user is traveling, or intending to travel. This would allow for a more detailed report to be catered to the specific user that would benefit from the information than can be provided by current AM radio-based systems. The user would not be required to listen to the traffic report of the entire city, but rather just that portion which is useful to the specific user.

Additionally, the user would be able to annotate/update the road conditions with real time information, allowing the users behind him to choose intelligently what route would be the quickest and safest.

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